

SHORT COMMUNICATION

FORMULATION AND PROXIMATE COMPOSITION OF ACHA PLANTAIN COMPOSITE FLOUR.

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ABSTRACT

In recent years, research efforts in the developing countries have focused on the formulation of food with low glycemic content and high nutritive value. Acha and plantain flour have been found to meet this criteria and so the need to formulate food with acha and plantain composite flour at different ratio to complement each other's nutritive constituent. The composite flour were rationed at 80:20, 70:30, 60:40, and 50:50, of acha plantain flour for samples A,B,C,D respectively and 70:30, 60:40, of plantain acha flour for samples E and F. Samples G and H are 100% plantain and acha respectively. The proximate composition showed that an increase in percentage composition acha increase the protein, ash, and fat content of the composite flour. Value ranged from 7.7 – 8.7% (protein), 3.9 – 4.8% (ash), 1.05 -1.97% (fat), and 1.20 – 1.40 % (crude fibre). The proximate composition of 100% acha and plantain flour are 3.72, 2.01%; 8.2, 4.53%; 2.2, 0.88%; 1.10, 1.64%; for ash, crude protein, fat and crude fibre respectively.

KEYWORDS: Proximate, acha, plantain, flour, formulation, composition.

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INTRODUCTION

Acha *Digitaria exilis* and *Digitaria iburua* which is also known with other names as hungry rice, fonio, findi, pom and kubug in different West Africa has been reported as the oldest West Africa cereal NRC, (1996). It is known as acha in Nigeria. Abdullahi and Luka, (2003) reported annual yield of 3,098 metric tonnes, 112,00mt and 126,000mt in Nigeria. The grains are widely grown in Nigeria in the cool region of Plateau state, parts of Bauchi, Kebbi, Taraba, Kaduna and Niger State. The crops grow well in poor sandy or ironstone soils in areas of low rainfall. In Northern Nigeria, the grains of *Digitaria exilis* (white) and *Digitaria iburna* (brown) commonly called acha or hungry rice and are harvested 3 – 4 months after sowing.

Acha remains vital to the security of millions of African farmers who use acha in several ways. Acha grains can be ground into flour and used to prepare local beverages, it can be cooked in various forms with fish, meat, legumes or vegetables. The grains are also used to prepare feeds for domestic animals. Acha is used as brewer's grain, for making couscous, and gwete a local birom porridge eaten in Plateau State. It is also mixed with other flour to make bread while the husk is a source of domestic fuel for cooking (Ogobonnaya and Aminat, 2008).

Acha grains are rich in methionine, an essential amino acid that is lacking in many major cereals (Temple and Bassa, 1991). The diet has relatively low sugar and low glycemic content and that makes it adequate as a suggested diet for

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diabetic patient. Acha is easy to digest; it is traditional recommended for children, old people who cannot digest other cereals, sick people and for people suffering from stomach disease (Cruz, 2004).

Plantain belongs to musacace family and is cultivated in many tropic and sub tropical countries of the world (Akomolafe and Aborisade, 2007). According to FAO (2002), over 2.3 million metric tons of plantains are produced in Nigeria annually. Plantain pulp is very rich in iron, potassium, vitamin A and ascorbic acid but low in protein (Adegboyega, 2006). It is consumed in Nigeria as snacks in form of chips, dodo ikire etc.

Unripe plantain is traditionally processed into fufu in Nigeria and other West African countries (Ukhum and Ukpabor, (1991). The flour produced is mixed with boiling water to prepare an elastic pastry (amala in Nigeria and fufu in Cameroun), which is eaten with various sauces. It is however gradually finding application in weaning food formulation and composite flour preparation (Olaoye *et al* (2006); Otegbioyo *et al*, (2002); Mepba *et al* (2007); and Ogazi *et al*, (1996). Unripe plantain meal is usually consumed by diabetic patient to reduce postprandial glucose level. This is because the propensity of individuals to develop diabetes and obesity is due to the increased consumption of carbohydrate rich foods with high glycemic index (Willett *et al*, (2002); Foster *et al* (2003).

Composite flour technology has been used as a means for extending scarce supplies of nutrient or the other lacking in a food product. In selecting the component to be used in composite flour blends, the materials should be readily available, culturally acceptable and provide increased nutritional potential. Furthermore, the foods produced should be organoleptically accepted look and taste like traditional foods.

Objectives

In view of the high nutritive value and low glycemic content of acha and plantain. This study is aimed at:

- a) Formulation of acha plantain composite flour at different ratio.
- b) Determine the proximate composition of acha plantain flour at different ration.
- c) and to recommend appropriately.

MATERIALS AND METHODS

Acha was bought from the open market in Jos, Plateau state of Nigeria. The grains were washed, destoned, sundried and milled to obtain flour. Furthermore dried unripe plantain was also bought from the open market in Ilorin and milled to obtain flour. Both flours were mixed in different compositional ratios of 80:20; 70:30; 60:40; 50:50 as samples A,B,C,D for acha to plantain flour composite flour respectively, 60:40, 70:30, as sample E,F for unripe plantain to acha flour respectively and samples G and H for 100% unripe plantain and acha respectively.

Determination of crude fibre, moisture and ash content of all the rationed composite flour of acha and plantain were carried out using AOAC (1990) method, the nitrogen was determined by micro Kjeldahl method described by Pearson 1976 and nitrogen was converted to protein by a factor of 6.25. Determination of crude fat was done using a soxhlet (Cehmglass) type of direct solvent using petroleum ether (boiling range of 60- 80 °C) as solvent. Total carbohydrate content was estimated by difference. All the proximate values were reported in percentages.

RESULTS AND DISCUSSION

Table 1 presents the proximate composition of acha plantain composite flour, 100% acha and plantain flour respectively. The result showed that 100% acha flour has a moisture content of 10.35%,protein 8.2%, fat 2.2%, crude fibre 1.10% and carbohydrate 74.43% which is similar to that reported by Echendu *et al* (2009) which stated moisture 10.33%, protein 8.29%, ash 2.01%,fat 2.26%, crude fibre 1.78% and carbohydrate 75.12%. Furthermore, results for 100% plantain revealed moisture content 10.55%, protein 4.53%, ash 2.01%, fat 0.88% crude fibre 1.64% and carbohydrate 80.39%.These results are also similar (Protein 4.54%, fat 0.75%, ash 1.96, crude fibre 1.83% and carbohydrate 83.1) to that reported by Abioye *et al*. (2011).



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The table also showed that moisture content of various composite flour of acha plantain flour differs. The value ranges between 10.25 – 10.70%. From the results obtained, it showed that protein content for acha plantain ranges from 8.57 to 8.7% for samples A, B, C, and D. This implies that increase in percentage acha increases the protein content of the composite flour. Sample A rationed at 80% acha and 20% plantain has the highest protein content of 8.7%. Also, decrease in percentage substitution of acha decreases the protein content which ranges from 7.7 – 7.9% for samples E and G. The result supports the fact that acha is richer in protein than plantain flour. Also, acha protein is reported to be unique in that it has greater methionine content than other cereals (Jideani and Akingbala, 1993). The ash content values of composite acha plantain differ. They range from 4.35 to 4.8% for samples A, B, C, D and 3.9 to 4.1 for samples E and F respectively. From the result obtained it showed that an increase in acha increases ash content of the composite flour at ratio 80:20, 70:30, 60:40, 50:50, of acha plantain flour. Ratio 80:20 of acha plantain flour showed the highest ash content of 4.8. This supports the work reported by Oyenuga, (1968). Temple and Bassa, (1991) reported that acha is rich in ash than the values reported for millet, wheat, maize, oat and sorghum. Plantain is also a rich source of iron.

Crude fibre value ranged from 1.20 – 1.50 which showed there were no significant different in crude fibre of acha plantain composite flour, this shows that acha and plantain are not rich source of crude fibre. Furthermore, increase in percentage composition of acha increases fat content of the composite flour. The value ranges between 1.05 – 1.97%, significant increases were seen in ratios 80:20, 70:30 and 60:40 acha plantain flour. Also, increase in plantain, increases carbohydrate content of acha plantain flour, values ranged from 72.88 to 75.4. Ratio 70:30 of plantain acha showed the highest result. This result showed that plantain and acha are good source of carbohydrate for man as reported by Marriott *et al*, 1981 and Ogbonnaya and Aminat (2008).

TABLE 1. Proximate composition of samples

	Samples	Moisture content %	Ash content %	Crude protein %	Crude fat %	Crude fibre %	Carbohydrate content %
A	Acha/plantain 80 : 20	10.25	4.8	8.7	1.97	1.40	72.88
B	Acha/plantain 70 : 30	10.30	4.6	8.66	1.82	1.28	73.34
C	Acha/plantain 60 : 40	10.32	4.4	8.62	1.78	1.40	73.46
D	Acha/plantain 50 : 50	10.70	4.35	8.57	1.5	1.50	73.38
E	Plantain/acha 60 : 40	10.68	4.1	7.9	1.22	1.20	74.90
F	Plantain/acha 70 : 30	10.65	3.9	7.7	1.05	1.30	75.4
G	Plantain 100%	10.55	2.01	4.53	0.88	1.64	80.39
H	Acha 100%	10.35	3.72	8.2	2.2	1.10	74.43

CONCLUSION

Based on this study, acha and plantain composite flour is a food with low glycemic content which is a suitable diet for children, youth, old and diabetic patients. Acha plantain composite flour can be reconstituted in boiling water to a thick smooth paste (amala), it can also be used as weaning food. The proximate composition of acha plantain flour showed that the food has good nutritional value though further work should be done to fortify with protein rich food to enhance the protein content and crude fibre. From this study acha plantain at 50:50, 60:40, percentage composition is recommended.



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